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Europäisches Patentamt

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Office européen des brevets



11 Publication number:

**0 504 761 A1**

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## EUROPEAN PATENT APPLICATION

21 Application number: **92104427.7**

51 Int. Cl.<sup>5</sup>: **A01N 43/653, A01N 25/32**

22 Date of filing: **14.03.92**

30 Priority: **18.03.91 US 670669**

43 Date of publication of application:  
**23.09.92 Bulletin 92/39**

84 Designated Contracting States:  
**AT BE CH DE DK ES FR GB GR IT LI LU NL PT SE**

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**BE CH DK ES FR GB GR IT LI LU NL PT SE**

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54 **Safened fungicidal composition.**

57 **Safening of the fungicide cyproconazole employing rose Bengal.**

**EP 0 504 761 A1**

The present invention concerns fungicidal compositions comprising  $\alpha$ -(4-chlorophenyl)- $\alpha$ -(1-cyclopropylethyl)-1H-1,2,4-triazole-1-ethanol as active ingredient.

It is known that  $\alpha$ -(4-chlorophenyl)- $\alpha$ -(1-cyclopropylethyl)-1H-1,2,4-triazole-1-ethanol hereinafter referred to by its generic name cyproconazole has interesting fungicidal activity against a broad spectrum of phytopathogenic fungi such as particularly powdery mildew, rusts, scabs, Septoria, Monilinia, Venturia, Cercospora, Rynchosporium, Ustilago, Tilletia and others.

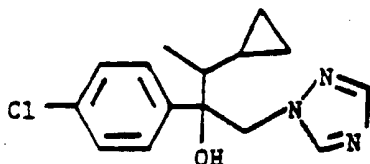
It is also known e.g. from European Patent Application No. EP 297426 that the fluorescein derivative rose Bengal (also known as rose Bengale) reduces the phytotoxicity of certain azoles in seed dressing formulations.

In the treatment of fungal diseases on plants it is essential that the chosen fungicide be employed at application rates which are not phytotoxic to plants. The margin between the application rate providing substantial control of fungal infestation and the application rate causing phytotoxic symptoms to plants should therefore be sufficiently great to allow a safe and flexible antifungal treatment of plants. The objective of this invention is to provide a formulation which reduces the phytotoxicity of cyproconazole while maintaining a sufficient level of its fungicidal activity.

It has now surprisingly be found that rose Bengal also reduces the phytotoxic threshold of cyproconazole.

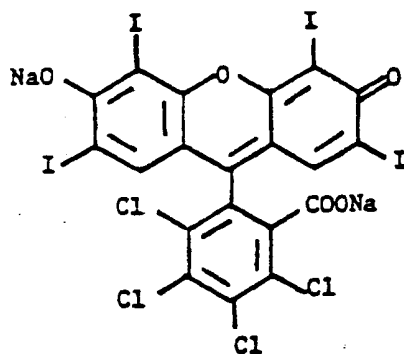
The invention therefore provides a fungicidal composition comprising a fungicidally effective amount of cyproconazole and rose Bengal in an amount sufficient to reduce the phytotoxicity of cyproconazole.

Cyproconazole, which has the formula



its preparation, use and formulation are known e.g. from USP 4,664,696.

Rose Bengal is 4,5,6,7-tetrachloro-2',4',5',7'-tetra-iodo fluorescein di-sodium salt of the formula



(cf. Merck Index 11th ed. 1989 p. 1314). The invention is also intended to encompass the use of other salts e.g. alkali metal salts other than the disodium salt shown such as the potassium salt.

The ability of rose Bengal to reduce the phytotoxicity of (i.e. safen) cyproconazole may be employed in various ways. For example it may enable cyproconazole to be employed as a seed dressing agent at rates which had previously been phytotoxic and thus prevented fungi which required such rates for control from being combatted or seed of particular crops from being treated at all. This may also be viewed as broadening the effective window between the minimum application rate needed for satisfactory control of the pathogen and the maximum application rate at which no significant phytotoxicity is observed for cyproconazole.

In addition to its safening effect rose Bengal enhances the fungicidal effect of cyproconazole. The enhancing effect may also serve to allow a reduction of application rate without loss of effectiveness or to improve efficacy on fungi where less than adequate control was observed at lower rates.

The safening effect of rose Bengal on cyproconazole can be demonstrated in standard greenhouse and field tests for example employing seed treatment of cereals e.g. wheat and observing the relative inhibitory effect of cyproconazole formulations with and without rose Bengal on the emergence and growth of seeds.

These tests show a reduction of such inhibitory effect when employing rose Bengal in combination with cyproconazole.

Combined treatment according to the invention is particularly suitable for cereals especially wheat and barley.

The amount of rose Bengal and cyproconazole to be used will vary depending on a variety of factors such as crop seed used, target pathogen, soil composition, climate and the like.

In general, satisfactory effects with seed dressing applications will be obtained when employing from 0.5 gm to 75 gm, more preferably from 0.5 gm to 25 gm, of rose Bengal per 100 kg of seed. Cyproconazole will conveniently be employed in an amount of 0.5 gm to 10 gm, especially 0.5 to 5 gm per 100 kg of seed. A typical treatment would be for example with 1 g each of rose Bengal and cyproconazole per 100 kg of seed suitably formulated.

Cyproconazole and rose Bengal may be co-applied in conventional manner in the form of premixes, tank mixes or by sequential treatment. Application is conveniently in the form of a suitable seed treatment formulation e.g. as an aqueous dispersion or as a dry powder having good adherence to the seeds whereby liquid formulations are preferred.

Suitable seed dressing formulations may be obtained in conventional manner, by mixing appropriate amounts of cyproconazole and rose Bengal and agriculturally acceptable diluents or carriers e.g. as described in USP 4,664,696.

The amount of active ingredient contained in such formulations will depend on seeds to be treated, method of treatment and the like. In general formulation will contain 0.2 to 30, especially 0.2 to 10% w/w of rose Bengal and 0.2 to 12, especially 0.2 to 6% w/w of cyproconazole.

A typical example for the preparation of a seed dressing formulation is as follows.

#### EXAMPLE 1 Seed Dressing Formulation

	Ingredients (% w/w)	
i)	Cyproconazole 10% WG	4.0 (= 0.4 cyproconazole a.i.)
ii)	KELZAN ®	0.3
iii)	PROXCEL GXL ®	0.1
iv)	PLURONIC ® P105	2.0
v)	Dist. Water	78.05
vi)	Urea	5.0
vii)	Sunspray GE oil	10.0
viii)	rose Bengal (di-sodium salt)	0.5
ix)	DREWPLUS ® L-768	0.05

Kelsan and Proxcel GXL added to the dist. water and osterized (blended) until dissolved. The cyproconazole is then added and osterized at 30% power for 5 min. The remaining ingredients are added and osterized for a final 5 min. at 30% power.

ii) polysaccharide gum; Kelco, San Diego CA

iii) 1,2-benzisothiazolin-3-one, NaOH, dipropylene glycol, H<sub>2</sub>O; ICI, Wilmington, DE

iv) polyglycol, BASF, Parsippany, NJ

vii) Sun Refining, Maritime, PA

viii) Pylam Products Co. Ltd., Garden City, NY 11530

ix) Silicone at-foramant; DREW-AMEROLD, Boonton, NJ

#### Claims

1. A fungicidal composition comprising a fungicidally effective amount of cyproconazole and rose Bengal in an amount sufficient to reduce the phytotoxicity of cyproconazole.

2. A composition according to Claim 1 wherein rose Bengal is in its di-sodium salt form.

3. A composition according to Claim 1 comprising 0.2 to 12% w/w of cyproconazole and 0.2 to 30% w/w of rose Bengal.
- 5 4. A composition according to Claim 1 comprising 0.2 to 6% w/w of cyproconazole and 0.2 to 10% w/w of rose Bengal.
5. A method of coating seeds which comprises applying to the seeds a composition of any one of Claims 1 to 4.
- 10 6. A method of suppressing fungal diseases of plants which comprises co-applying to the seeds of said plants a fungicidally effective amount of cyproconazole and rose Bengal in an amount sufficient to reduce the phytotoxicity of cyproconazole on that plant.
7. A method according to Claim 6 wherein rose Bengal is in the di-sodium salt form.
- 15 8. A method according to Claim 6 which comprises co-applying from 0.5 gm to 10 gm of cyproconazole and 0.5 gm to 75 gm of rose Bengal per 10 kg of seeds.
9. A method according to Claim 6 which comprises co-applying from 0.5 gm to 5 gm of cyproconazole and 0.5 gm to 25 gm of rose Bengal per 100 kg of seeds.
- 20 10. A method according to Claim 6 wherein the seed is a cereal.
11. A method according to Claim 6 wherein the seed is of wheat.
- 25 12. Seeds coated with a fungicidally effective amount of cyproconazole and an amount of rose Bengal sufficient to reduce the phytotoxicity of cyproconazole.

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## EUROPEAN SEARCH REPORT

Application Number

EP 92 10 4427

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D, X	EP-A-0 297 426 (BAYER AG) * page 6, line 39 - line 42 * * claims *	1-12	A01N43/653 A01N25/32
A	GB-A-2 136 423 (SANDOZ) * page 4, line 41 - line 54 * * page 5; example 1 * * claims *	1-12	
D	& US-A-4 664 696 (F. SCHAUB)		
A	CHEMICAL ABSTRACTS, vol. 114, no. 21, 27 May 1991, Columbus, Ohio, US; abstract no. 201604W, J.P. DEVEY ET AL.: 'Effectiveness of cyproconazole, alone and in combinations, against a range of stem base and foliar diseases in winter wheat. Pests Dis. 1990, (2), 801-6' page 291 ; * abstract *		
A	EP-A-0 287 346 (E.I. DU PONT ET NEMOURS AND COMPANY) * claims *	1-12	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	EP-A-0 146 059 (STERLING DRUG INC.)		A01N
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26 JUNE 1992	Examiner DALKAFOUKI A.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure F : intermediate document		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

